

*** How can we be sure that the quality of service will be maintained? Won't the winner be the provider who offers both the lowest price *and* the lowest quality?**

The problem highlighted here is real, but hardly unique to an auction approach to universal service subsidies. Indeed, as long as regulators set the price paid by consumers below the cost of providing that service, they will also have to regulate the quality of service received.

Because the auction approach to universal service subsidies encourages competition, the provider who does not serve a customer well is more likely to find itself subjected to a healthy dose of market discipline.

If we employ a subsidy mechanism based on historical costs, for example, there is still a threat that the provider will supply service of a lower quality than that specified in its contract. The government -- which created the subsidy arrangement -- remains obligated to see the terms of this arrangement fulfilled. Regulators can enforce quality standards under an auction approach much like they would under alternative subsidy approaches.

Moreover, because the auction approach to universal service subsidies encourages competition, the provider who does not serve a customer well is more likely to find itself subjected to a healthy dose of market discipline. That is, new entrants may decide to serve the market immediately, or may look to bid for subsidies in the next round (no more than three to five years away). The auction approach, therefore, should provide the same protection against poor quality as other approaches, while enjoying some of the added benefits that competition brings.

*** How can a potential service provider estimate its cost of service without knowing that it has won all auctions in a given area? Wouldn't an auction for a much larger area -- say an entire local exchange -- be more efficient?**

This is a general question as to the overall efficiency of an auction process. Some administrative difficulties are avoided if a provider knows that it will receive a specific subsidy for an entire exchange, as opposed to having to bid for a subsidy in a series of smaller markets that together comprise an exchange. Without a larger area to plan for, a provider may find it uneconomical to only serve the portions of an area in which it wins a subsidy in the auction process.

Under an arrangement that grants subsidies only for large service areas, however, there also remains a much greater possibility that the provider will have to average the costs of providing service to many different groups. As discussed previously, this practice may undermine the subsidy arrangement.

The simultaneous ascending auction. One method to overcome these problems and allow the provider to better plan its service is the "simultaneous ascending auction," which involves multiple rounds of bidding. This method has been well-tested, as it has been successfully used to auction licenses for personal communications services (PCS).¹⁵ Under this approach, the bidder can determine, after each round of bidding, whether it is likely to win a sufficient subsidy in the "package" of areas in which it would like to offer service. Only if it believes that the total return on the package will be worthwhile will it continue in the bidding.¹⁶

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Under this method, the auction process proceeds in stages, with each bidder posting a bond proportionate to the number of markets on which it is bidding.

These participants remain eligible to continue in each round by submitting either the best bid (i.e., the lowest) or one that is otherwise acceptable (i.e., sufficiently close to the lowest bid) for a certain number of markets in which it is interested, as explained below.

In the first stage, a participant must be the low bidder or be close to the low bidder on a percentage of all markets in which it is competing for a subsidy (say, 30 or 50 percent). In the next stage, this participant must do so on a larger percentage (say, 70 or 80 percent). In the third and final stage, the participant must meet this criteria on all markets in which it hopes to receive support. If at any time the bidder falls below these prescribed minimum levels, it is penalized with a reduction in the number of markets in which it may receive support.

To illustrate, consider a market with 40,000 high-cost subscribers, or the equivalent of 100 Census Block Groups (CBGs), each with 400 households. Suppose a potential provider believes it could not provide service for less than the current subsidy (the ceiling) in 10 of these groups. For the other 90 groups, it is willing to serve for a smaller subsidy than that currently paid, but only if it can win customers from at least two-thirds of these groups. In other words, the provider's own cost considerations make it necessary for it to serve at least 60 of the CBGs in order to have a profitable "package" of areas.

¹⁵ For a discussion of this successful application of auctions to an important telecommunications market, see McAfee, R. Preston, and John McMillan, "Analyzing the Airwaves Auction," Journal of Economic Perspectives, Vol. 10, No. 1, (1996) pp. 159-75. The analogy to the PCS experience is not perfect, however. In the PCS example, synergies existed in the demand (customer) side of the market, as customers desired a service that could reach over a large geographic area. In high-cost telephone markets, synergies would exist only in the supply (cost) side of the market. In both cases, however, it is useful for potential service providers to be able to take these synergies into account.

¹⁶ The need to win in a certain number of markets in order to make an investment profitable reflects the firm's economies of scale, or decreasing unit costs, as the level of production increases. A provider that cannot win enough subsidies to operate at a minimum level of production (i.e., serve a minimum number of subscribers) may not have sufficiently low per-subscriber or unit costs to profitably serve these markets.

This provider would bid on the 90 groups it could profitably serve with a subsidy, in each stage making sure it is the low bidder or is sufficiently close to the low bidder in enough markets (i.e., 30 percent, or whatever minimum exists for that stage) to allow it to continue bidding in the next stage. Because of the penalty of being removed from at least some markets if it does not do this, the provider is motivated to consistently bid low.

By employing such a simultaneous ascending auction focused on small areas, the service provider can perform the necessary calculus to determine if it can profitably serve a market or combination of markets with a given subsidy. At the same time, this provider will not be likely to "accidentally" win auctions for a scattered set of markets in which it could neither efficiently nor profitably operate.

*** What about markets in which no alternative provider comes forward to bid for a subsidy? Aren't there really very few markets in which potential providers actually exist?**

The market in which no alternative carrier wishes to compete for a subsidy is, at least to some extent, a monopoly. However, since no entry barriers exist (as discussed below), at any time this market may be contested. The question, then, is what level of subsidy to give to the provider until auctions become a viable alternative. Perhaps the simplest response to this question begins with recalling the alternative models -- subsidies based on historical costs and subsidies based on forward-looking costs.

Establishing a subsidy based on forward-looking costs may result in a loss for those providers with historical costs that include older technology or inefficient investment. In these cases in which forward-looking cost estimates are too low to allow any provider to serve the market (including the incumbent), the regulator must find the extra amount of subsidy that would induce entry. The current subsidy to the incumbent certainly fulfills this criterion, though it may be overly generous since service might well be guaranteed for a lesser subsidy.

The status quo subsidy, which will often be based on historical costs, may thereby provide a type of subsidy ceiling. Specifically, regulators may offer to compensate the monopoly provider at a level up to -- but no higher than -- some measure of historical costs. This would effectively provide a cap that the subsidy could not exceed. Moreover, this cap could be used in all high-cost markets, such that no provider could earn a subsidy above that paid to the current incumbent service provider.

Establishing a maximum subsidy based on historical costs will allow inefficiencies to persist, since the estimate may be based on inflated costs. However, some comfort may be taken in that these incentives for inefficient behavior will not increase beyond their current level. That is, while different auction mechanisms will vary in how well they control costs, the maximum subsidy will prevent this support from exceeding its current amount.

The threat of competition. Moreover, any existing inflated costs may be mitigated or eliminated by a new entrant at any time. Since the *threat* of competition may be as effective at keeping prices down as competition itself, regulators should let sole providers know from the onset that the market will be opened to an auction the moment a potential competitor applies. The palpable threat of competition should be a consistent influence.

Finally, while many markets will remain without competition for some time to come, the number of markets with competition is rapidly increasing. This new competition will help lower the costs of operation in these markets and, as a result, the subsidy needed for their support. For example, following the Telecommunications Act of 1996, both cable television providers and long-distance companies are free to compete in the provision of basic local service. Add cellular providers, digital broadcast satellite services (DBS), and LMDS (i.e., wireless local video), and the number of providers of related services that can conceivably enter local exchange service becomes quite significant.

These are more than theoretical observations. Potential competitors have already been certified as competitive local exchange carriers in a number of states. As an illustration, a recent report notes that MCI Metro and MFS Communications Co. have, respectively, 16 and 17 states in which they hold certification as competitive local exchange carriers.¹⁷

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Moreover, the number of potential competitors in any one market may be substantial. The state of California reports that 57 alternative carriers have been certified to offer switched local service, with another 10 carriers awaiting certification.¹⁸ These are companies using currently available technology to provide competition right away.

*** How do we promote competitive outcomes in less-than-competitive markets, and especially in rural markets?**

In such cases, a ceiling on subsidies would be used, as described above. At the same time, the bonus that would be offered to low bidders would help encourage more providers to come forward.

The incentive bonus would also encourage providers who are tacitly colluding to "cheat" on their arrangements. That is, those artificially bidding up their subsidy request would be rewarded for not doing so. Cheating on any tacit collusive agreement means offering a lower bid, and the lowest bidder would be rewarded by gaining a substantial competitive edge over its rival (in the form of a higher subsidy).

¹⁷ Local Competition Report, vol. 5, no. 13 (June 24, 1996).

¹⁸ *Ibid.*, vol. 5, no. 17 (Aug. 19, 1996).

The use of a single-round auction might provide an alternative means to help limit collusion. Bidders under such an arrangement would have a significant incentive not to adhere to any collusive agreements, since they would have no future auction rounds in which to revise their estimate should they be undercut by a rival. As a result, the first bid would more likely approximate the true cost of providing service.

*** How can we encourage all potential providers to enter the bidding process?**

This is a challenging question for proponents of auctions, but it should in no way be an insurmountable one. The difficulty lies in balancing two interests. First, in order to finance its investment in the particular market, the provider receiving a subsidy will want to plan on having that subsidy for a set period of years. If some minimum period of contract is not available, potential entrants will face higher risks on their investments. This higher risk could conceivably discourage otherwise viable providers from entering the market.

Second, consumers will want to enjoy the benefits from new technologies and new services as much as possible, and ratepayers or taxpayers will want the subsidy they finance to be as small as possible. Both of these results will come only if low-cost operators are free to drive down the level of the subsidy through competitive bidding. A new entrant with considerably lower costs will want to outbid its rivals, thus "punishing" them with a lower subsidy and giving itself a strategic advantage with the highest subsidy in the market.

Striking a balance. These competing interests will require a balance to be struck that minimizes two potential costs: lost opportunity for new competition because of the risk associated with a contract that is too short, and lost opportunity for new competition because of the inability to bid for a new contract (i.e., a new subsidy) within a shorter period of time.

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Perhaps the best solution would be to use the auction to set the level of the subsidy for some three to five years. This would encourage the initial provider to maintain the quality of service necessary to keep its customers while allowing it a fair chance to recoup its capital outlays in the market.

Significantly, however, this approach does not rule out the entry of new competitors into the market. Consider, for example, the hypothetical case mentioned earlier, in which the winning bidder receives a \$30 subsidy and all other participants receive \$20 in monthly support. If after the auction a new provider desires to enter the market, it may do so and receive a \$20 subsidy. Whereas before the lowest-cost provider needed \$50 in order to serve the market (\$30 in subsidy and \$20 from the regulated price), this new provider would only enter if it could profitably operate at the lower cost of \$40 (\$20 subsidy plus \$20 price).

Such a subsidy arrangement, while certainly not perfect, at least attempts to promote market-like behavior by encouraging more efficient providers to enter. It also makes it less likely that both high-cost consumers and those who finance their subsidy will not be denied the benefits that competition can bring, even in subsidized markets. Moreover, as the period of guaranteed subsidy ends and a new auction begins, this more-efficient new entrant will presumably win the auction with its lower cost requirements, thus lowering the necessary subsidy.

The essential point from this discussion is simple: Inserting competitive processes into any universal service subsidy is critical for cost management, technology advancement, and the transition to a more competitive (and subsidy-free) telecommunications marketplace.

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A subsidy arrangement based on auctions may be the best way to promote such a result.

But Who's Going to Pay For It? Financing the Subsidy Fund

In keeping with the principles of the Telecommunications Act of 1996, the financing for any high-cost subsidy program should be both nondiscriminatory and explicit. The proposal that best meets this criteria would take the funds for subsidies out of general taxation. However, the legislation makes it clear that only telecommunications providers (and ultimately, their customers) will pay any tax. Thus, the choice focuses on the least discriminatory and most explicit tax on this group.¹⁹

One alternative tax might be a usage-based surcharge. Such a fee would be relatively easy to impose, as the tax would simply be based on the number of calls or minutes of use provided by each carrier. Under such an approach, one's tax burden would be based on the amount of time spent on the network (in minutes or in number of calls).

Flat tax better. Perhaps a better alternative (though still only a second-best answer) would be a flat, non-usage-sensitive tax on all access lines. Such a tax would appear as a monthly surcharge added to the subscriber's telephone bill.

What is the advantage of a flat tax on access as opposed to a usage-based tax? The flat, non-usage-based tax is less distortive than the usage-based tax. Why? The usage-based tax distorts the market by imposing an extra cost on each call (or each minute of every call). In so doing, it drives a wedge between how much an individual values the call and the true

¹⁹ It is worth noting that all taxes distort the market. Thus, as a matter of first principle, they should be avoided. However, once the decision is made to impose some type of tax, that method of taxation which is least distortive should be chosen.

cost of providing that call (independent of the tax) on the margin.²⁰ This extra burden or wedge will be sufficient to keep at least some calls from being made; calls that customers would have made were it not for the tax.

In contrast, the flat, non-usage-based tax imposes a single fee that the customer must pay up front. An individual's decision as to how much telecommunications service he or she wants once service has been acquired (i.e., how many calls to make or how much time to spend on the phone) is made independent of the tax. If telecommunications consumers are less likely to respond to a tax on access lines (by subscribing to fewer of them) than they are to a tax on usage (by calling less), then taxing the former has less effect on the market.²¹ The tax, in other words, is less likely to change how much individuals will use the network.

Truth-in-taxing. Addressing a separate but important concern, the reporting of this tax should be clear and unambiguous. To achieve this goal, a subscriber's monthly statement should report the exact amount of his or her tax liability for the month, as well as how much of this tax supports each of the two types of funds. This is the most honest approach to tax policy. Moreover, determining the reported cost of service need not involve great debate. Telephone companies receiving subsidies in high-cost markets have already acknowledged a particular price per customer, and local telephone companies in general report information on the costs of providing service to state and federal regulators.

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The result of this new tax would, therefore, look something like that shown below in Exhibit 1. All subscribers would receive a monthly statement with their amount due. A tax for low-income assistance and a tax for high-cost assistance would be listed, along with the cost of providing the service. Telecommunications customers would know what they are paying for, whom they are assisting, and the actual cost to them for providing assistance.

²⁰ This is especially true in telecommunications markets, since the average subscriber imposes much lower costs on the network in terms of usage than his or her cost of access. In fact, usage costs are only significant at peak hours, when the network's capacity is fully utilized.

²¹ In economic terms, if consumers' demand for access is less elastic than their demand for usage, taxing access will have less of an effect on the overall quantity of telecommunications service consumed in the market.

Exhibit 1

Hypothetical case of two different telephone bills -- one for the subsidy recipient and one for the payer -- under new subsidy arrangement.

CUSTOMER 1 (subsidy recipient)

Costs allocated to you for basic phone service	\$18
High-cost customer support tax	\$ 2
Low-income support tax	\$ 1
Please pay this amount	\$21

Fixed costs of service for your line²²	(\$60)
Your net tax (or subsidy) above the cost of providing your service	(\$39)

CUSTOMER 2 (subsidy payer)

Costs allocated to you for basic phone service	\$18
Low-income support tax	\$ 2
High-cost support tax	\$ 1
Please pay this amount	\$21

Fixed costs of service for your line	(\$15)
Your net tax (or subsidy) above the cost of providing your service	\$6

²²This value would be specific to the census block group in which the subscriber resided, and would approximate non-traffic-sensitive costs similar to those reported in FCC Docket No. 87-339.

The Other Half of the Equation

In order to make it easier to visualize, the preceding table makes an assumption that all subscribers pay the same basic rate. Unfortunately, in so doing it may also imply an acceptance of setting high-cost customer rates at a particular level. For example, both the subsidy payer and the payee in this example are charged exactly the same rate. This need not be the case. In fact, it is perfectly legitimate to assume that some customer might pay slightly more for considerably more expensive service. To the extent that service costing \$50 per month can be billed to the customer for \$30 instead of \$18, the total expense of universal service to high-cost areas will diminish greatly.

This argument underscores the other half of the cost equation in determining universal service subsidies. That is, for customers not paying for the entire cost of their service, the subsidy can be minimized by lowering the cost or raising the price paid. It is with the latter point, however, that concerns arise as to the potential for subscribers to drop off the network due to a higher price. Indeed, this concern supplies a large part of the justification for such subsidies in the first place.

While such a concern cannot be disregarded, it is not at all clear that a slightly higher price for basic service will drive high-cost customers off the network. Currently, about 60 percent of all households in the country subscribe to cable television, often paying well above the \$18 average for basic telephone service. Yet cable television is considered less "essential" than basic telephone service.

Subsidies must be paid for through burdensome taxes and for that reason should be no larger than absolutely necessary.

While households with sufficiently low incomes may be burdened by a price above \$18 per month, these will likely be eligible for low-income assistance. Such assistance is currently available from federal and state programs, and various state programs might evolve that would add to the federally established level of assistance. While we are not endorsing here any particular subsidy approach or amount of support, it is almost certainly true that state and local regulators can better deal with these issues. For this reason, any federal support for low-income subscribers should be viewed conservatively.

Subsidies must be paid for. Most importantly, middle-income households with significantly high-cost service should pay marginally higher rates for basic service at the same time low-income households are given enough support to keep them on the network. Acknowledging this point is simply to recognize two important realities: Subsidies must be paid for through burdensome taxes and for that reason should be no larger than absolutely necessary, and those most in need can be helped best by focusing support directly on them.

This perspective is in no way inconsistent with the Telecommunications Act of 1996. According to the Act, subscribers in rural and high-cost areas should have services that are "reasonably comparable" to those available in urban areas, and available at "just, reasonable and affordable rates."²³ This does not mandate that a rural customer who costs \$60/month to serve should pay the exact same rate as the urban customer who costs \$15/month to serve. Rather, the Act's language simply requires the FCC to make a determination as to what is "affordable" and to make sure that such service roughly approximates that offered in urban markets.

Conclusion

The Telecommunications Act of 1996 creates the possibility that massive new subsidies will support rural, insular, and high-cost areas. This legislation also requires explicit subsidies, and, in general, lays out principles for reform that remove entry barriers and other limits on competition. In short, the new telecommunications legislation both requires continued government involvement in this market and takes a step toward less regulation in the future.

The opportunity for less regulation goes hand in hand with the opportunity for new competitors to enter new markets. However, in the case of subsidized areas, opening these markets to more competition is problematic. Potential providers will not be interested in serving a subsidized market unless the total amount they earn (the rate paid by the customer plus the subsidy) equals the costs they incur in serving that market.

While various approaches exist to determine how much a particular carrier should receive for serving a high-cost market, potential problems exist with each. Estimates based on historical costs tend to inflate the actual expenses incurred. Forward-looking estimates overcome this problem, but lack a certain sense of reality. That is, while forward-looking methodologies are based on real-world technologies, they nonetheless represent a regulator's calculations for a hypothetical service. The actual calculations made by investors -- and their willingness to invest in a particular project -- better represent what are likely to be the most accurate cost estimates.

Important first step. For high-cost markets, competitive bidding may offer the most effective means to determine the minimum amount needed to provide a universal service subsidy. Such an approach can guarantee the same quality of service as that seen with other approaches, while simultaneously bringing competition to the market. It is this competition -- not determined regulators or well-developed models -- which ultimately drives costs down and efficiency up. To proceed down the road toward a truly competitive telecommunications industry, the approaches that stress this competition -- including those that focus on competitive bidding -- may provide an important first step.

²³ Telecommunications Act of 1996, Sec. 254(b).